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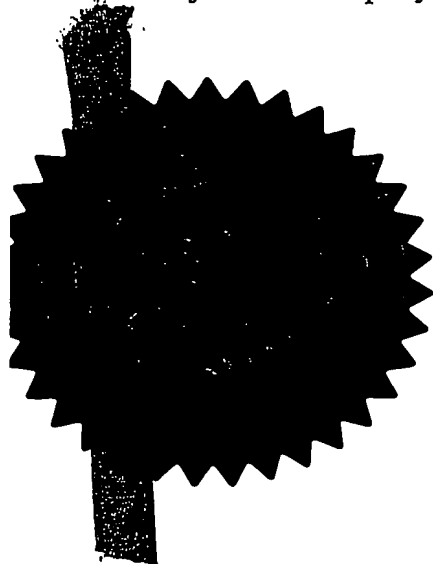
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1. Your reference

IRM/CSM/67501

2. Patent application number

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0129166.5

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3. Full name, address and postcode of the or of each applicant (underline all surnames)

Florix Technology Limited
The Triangle
Paulton
Bristol BS39 7LE

Patents ADP number (if you know it)

8282071001

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom (GB)

4. Title of the invention

Supply Current Usage Control System

5. Name of your agent (if you have one)

PAGE HARGRAVE
Southgate, Whitefriars
Lewins Mead
BRISTOL BS1 2NT

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Patents ADP number (if you know it)

059964830010

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Country

Priority application number
(if you know it)

Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
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 - b) there is an inventor who is not named as an applicant, or
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Description	8
Claim(s)	3
Abstract	1
Drawing(s)	1 + 1 <i>AK</i>

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Priority documents	-
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Statement of inventorship and right to grant of a patent (<i>Patents Form 7/77</i>)	-
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Request for substantive examination (<i>Patents Form 10/77</i>)	-
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11. I/We request the grant of a patent on the basis of this application.

Signature *Page Hargrave*
PAGE HARGRAVE

Date 03/12/01

12. Name and daytime telephone number of person to contact in the United Kingdom

Ian R. Muir

0117 927 6634

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SUPPLY CURRENT USAGE CONTROL SYSTEM

5 The present invention relates to a supply current usage control system for enabling a person to limit the supply of current to an electrical apparatus to enable only a specified total duration of use of the apparatus over a period of time.

10 There are various reasons why someone may wish the use of an apparatus to be limited to a maximum duration of use over a period of time. Parents, for example, may wish their child to view television for only a limited number of hours per week, weekend or day, whilst at the same time accepting that the child may decide when, during the week etc., that the actual viewing takes place and whether the viewing will be taken as one session or made up from individual shorter periods. The parents may also wish the same kind of restriction to apply to their child when playing electronic games. For different reasons owners of property may also wish to restrict the total time
15 of usage of certain apparatus by their tenants or customers, e.g. the use of games in a public house.

20 Timer utilising devices have been proposed into which apparatus can be plugged and which can be programmed to allow use of the plugged-in apparatus only during specified set times. One such unit is disclosed in UK Patent Application GB 2310323A and incorporates a lockable cover that can be closed and locked, to prevent tampering after the person exercising control has set the timer unit to permit use of the apparatus during a specified time period or periods. However, this device permits use during the full time of all set periods and, unless these are very restricted, the total
25 possible cumulative use may be greater than may be desired by the person wishing to set the duration limit.

30 According to the present invention a supply current usage control system is provided in or for use in a power supply path for an apparatus, which system comprises; timer control means which may be set to specify a total time duration for which supply of operating current to said apparatus is to be permitted to flow through the supply path; switch means controllable by the timer control means for permitting or interrupting the flow of operating current through the supply path; and current flow detection means for

detecting the flow of apparatus operating current through the supply path and for providing an output to said timer control means indicative of operation of said apparatus to enable determination of the cumulative time of operation of the apparatus.

5 With such a system the control apparatus can operate the switch means to interrupt the supply of operating current to the apparatus when the control means determines, on the basis of the current flow detection means output signals, that the apparatus has been used for the permitted total time duration. Preferably, the current
10 flow detection means may be set with an offset current threshold whereby standby currents below the threshold are ignored for the purpose of determining the duration of the flow of apparatus operating current indicative of actual operation of the apparatus.

 Preferably the timer control means can be set to both to determine a cumulative apparatus operational use period and to specify a specific daily time period
15 or time periods during which this cumulative use period may be built up. With such an arrangement, a parent, for example, may limit not only the total time for which television may be watched but also at which periods during the day it may be watched.

 The system may be provided in the form of an adapter that can be plugged
20 into an electric supply socket and which can have the apparatus supply cable wired to it or plugged into it and be provided with security arrangements to prevent unauthorised unplugging or unwiring of the apparatus supply cable.

 Alternatively the system may be built into a wall socket or into the apparatus
25 to be controlled.

 Where a house has a central computer control unit for controlling various household activities and apparatus, a further possibility is for the system to be part of this central computer control unit, with the timing control means being constituted by
30 the central computer unit and the current flow means being incorporated in or in association with a wall socket.

Clearly, it is necessary that the set time period substantially cannot be altered except by the authorised person who set the time in the first place.

5 A tamper switch arrangement may be provided, which arrangement will produce a signal for said control means to reset the usable period to zero in the event of unauthorised tampering or apparent tampering with the system. The tamper switch may be in the form of a micro-switch with its operating pin or button in contact with the inside of a lockable casing or other security arrangement for the system, for part of the system or for the timer unit of the system and which causes a signal to be sent to the control unit if the casing is opened or attempted to be opened by an unauthorised person.

Physical key operated means or password systems may be provided to ensure time settings may only be changed by those in possession of the key or password.

15 Audible and/or visual warning means may be provided to give an audible and/or visual signal a specified period before operating supply current is to be switched off by the timer control means.

20 The timer control means or setting means for the timer control means may be in a remote control unit separate from the wall socket unit or adapter unit containing the current flow detection means and switch means, with wireless signal transmission and reception being provided between the separate units.

25 For a better understanding of the present invention reference will now be made to the accompanying drawing which shows, purely diagrammatically and solely by way of example, an embodiment of the present invention. In some cases units are represented by blocks and in other cases by more detailed circuit components but the illustrated format is, as stated, intended to be solely an example and not intended to be limiting in any way.

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The drawing shows a power supply usage control system, in which three supply lines are represented, referenced E, N and L being respectively the earth, neutral and live supply conductors for supplying power to consumer apparatus. The input side

of the supply conductors is referenced IN and the output side is referenced OUT. When the control system is provided as an adapter to be connected to the end of a consumer apparatus power cable, OUT represents the cable between the adapter and the apparatus and IN represents the adapter pins that are to be plugged into a wall socket. Alternatively, if the control system is built into a wall socket, IN represents the terminals connected to the house mains wiring and OUT represents the socket terminals of the wall socket to be controlled.

The remainder of the power supply usage control system of the embodiment comprises a number of separate units. These are: time setting means formed by a micro-controller or processor unit 13, a real time clock unit 14, keypad input means 15 and an LCD display 16; a current flow detecting means shown outlined by dotted lines 8; a tamper switch 18; a warning buzzer 17; switching means, formed by relay 22 and switch contacts and armature 23, to permit or interrupt current flow through the live power supply line L; and AC/DC converter unit 3 to provide a DC supply voltage for the other units of the control system

Two conductors 1 and 2 connect the neutral N, and live L, supply lines to the AC/DC converter unit 3. Conductor 2 incorporates a fuse 4, to protect the AC/DC converter. AC/DC converter 3 incorporates a transformer T, which has its primary coil connected to the conductors 1 and 2 and its output coil connected to a bridge rectifier unit 5. The rectified output of bridge-circuit 5 is passed to a voltage regulator 6, the output voltage +V of which appears between terminals 7 and 8 as the output operating voltage for the control system units. Terminal 8 acts as the earth or ground terminal G as indicated by the earth symbol. Capacitors C5 and C6 are connected in parallel across the output terminals of the bridge rectifier unit 5 and voltage rectifier 6 respectively, to remove AC ripple voltage and to stabilize the output voltage +V. Terminals 7 and 8 are connected to the other units of the control system to provide the DC voltage +V as the DC supply voltage for those units. This is indicated by the terminals referenced +V and G at various locations in the drawing.

The current sensing arrangement 8 incorporates a low value resistance R1 (for example 0.1 ohms) connected in series in the neutral line, N. The voltage developed

across this resistance R1 is fed via conductors 10 and 9, capacitors C1, C2 and resistances R4 and R2 to the inputs of an operational amplifier 11. Operational amplifier 11 has a bias resistance R3 connected between the R2 input and ground G and a feedback resistance R5, between its output and the input connected to R4 and presents
5 a very high impedance across the input conductors 10 and 9. Operational amplifier 11 produces a half-wave rectified output voltage at its output terminal, which terminal is connected to one input terminal of an operational amplifier 12 by a series resistance R6. A capacitance C3 is connected between this terminal and ground G such that, with resistance R6, it forms a filter to smooth out the AC component of the output of
10 amplifier 11 so as to provide a substantially DC level, operating current representative, signal at the amplifier 12 output. The other input terminal of amplifier 12 is connected to the connection point between two resistances R7 and R8 which are connected in series between +V and Ground potential. The values of resistances R7 and R8 are chosen to determine a current detecting operating threshold voltage for the voltage
15 across resistance R1, such that small voltages developed across R1 as a result of small standby currents can be ignored by the current detection arrangement and not used to indicate operative use of connected apparatus. Operational amplifier 12 acts as a comparator and is arranged to provide an effectively digital output signal, with a 0 level output for no, or only stand-by, current through detector resistance R1 and a 1 level
20 output for an apparatus operating current flow through resistance R1.

The output from the current detection amplifier 12 is fed directly to the microcontroller circuit 13. This microcontroller circuit also receives real time representative signals from the real time clock 14 and can additionally be provided with
25 input signals from the keypad 15. Output signals from the microcontroller are coupled to the LCD display unit 16, the buzzer 17 and to the switching means relay 22.

Also, as indicated in the drawing, the tamper switch 18 is connected to the microcontroller. As shown, this switch is normally in a closed position such that the
30 voltage +V appears at the output from the tamper switch and is fed to the microcontroller. A parallel arrangement of a resistor R9 and C4 is connected between the input from switch 18 to the microcontroller and ground such that, if the switch 18

is opened, the voltage V on capacitor C4 will discharge to ground via resistance R9 and earth voltage will be applied to the tamper switch input.

5 As mentioned, the control system of the drawing will, in operation, be incorporated either in an adapter, a wall socket or in the input to consumer apparatus. The control system of this embodiment will be protected by a lockable cover for preventing access to control the timing set-up means, with the tamper switch 18 providing an indication of any attempt to open the cover. In the event that the cover is opened, the switch will open and the earth potential tamper signal will be passed to the
10 microcontroller 13. The tamper switch 18 could be positioned such that removal of the plug or adapter would operate the switch to cause resetting to zero of the usage duration available.

15 The AC/DC converter arrangement 7 simply provides the appropriate operating voltage for use by the other components of the system controller. Obviously, if desired, the converter 7 could be replaced or supplemented by a battery supply arrangement using some form of chargeable or non-chargeable batteries. Use of supplemental batteries would facilitate the retention of time settings in the event of a power failure.

20 In operating the control system, the person with authority to determine the settings of the system can use the keypad 15 to enter into the microcontroller both the permitted times during a day or week, etc that a user may operate apparatus connected to the control system. Also this authorised person will enter the permitted total
25 cumulative duration for which the apparatus may be used during the authorised period(s) of use. The real time clock 14 feeds the necessary timing information to the microcontroller and the LCD display can be used during programming of the microcontroller to check the accuracy of inputting of the settings. Subsequently the display can be operated to display the amount of time for which the connected consumer
30 apparatus has been used and/or the amount of time remaining for which the apparatus can be used. When the cumulative use is approaching the maximum permitted duration of use, the microcontroller device 13 will send a signal to the buzzer 17 to provide an audible warning to the user that the control system is about to operate the switch means

22, 23 to shut down the power supply to the apparatus. A visual indication, e.g. a flashing light (not shown), could also be provided as an alternative or additional warning device.

5 The actual period of use of the apparatus is determined using the current flow detection means 8. As mentioned above, this current detection means can be set with a threshold so as to detect the difference between standby current and actual operational current for the apparatus. Signals representative of actual operational use are sent from the output of operational amplifier 12, of the detection means 8, to the microcontroller 10 13 and the microcontroller will sum up the total time of use during a single or multiple periods of use in the permitted time period (s). Periods of non-use during that time period are ignored.

15 With this arrangement, the actual user, for example a child, is able to determine exactly when during the permitted periods of operation they will use the apparatus and may use the apparatus for one or several occasions until the total permitted time of use has expired. Therefore, they are given complete personal freedom of choice as to when to use the apparatus within an allowed period but at the same time their total usage may be controlled.

20 The actual implementation of the control system may vary so as to be incorporated within a house control system, operated by a central computer; to be an adapter arrangement for plugging into a wall socket and to which an apparatus plug may be lockably connected; or to be built into a wall socket, to which the apparatus is 25 connected. Other secure physical housing arrangements for the control system could be envisaged. As well as arrangements for physically locking the system, employing lockable covers, with keys etc, a password control system may be employed either alone or in combination with a locking arrangement.

30 Not all of the shown components need to be incorporated into one housing. Some parts, such as the keypad or other setting means may be in a separate control which can operate remote from the adapter or wall socket or house unit. Such an apparatus may link with the other components by means of infra red or other wireless

signals in the manner of TV remote controllers. One arrangement for remote control is indicated in the drawing. This arrangement comprises an infrared transmitter/receiver 19 for the micro-controller 13, together with a hand-held remote unit 20. The transmitter/receiver 19 and hand-held remote 20 communicate with each other using infrared signals 21 although other wireless signals could be used as an alternative. Remote controller 21 is provided with a keypad and also a display so that the person controlling the system may enter time control signals and receive confirmation of the setting on the display. Remote controllers could be provided for different levels of control as required. If only the power to remotely transmit setting signals is provided, only one way transmission would be required. At the other extreme, with two way transmission, all possible control and display functions could be provided, although, of course, one would need to be within reception range when signals were to be received or transmitted. Normally the remote controller would display or be operable only on request so as to avoid excessive power drain of the unit's battery supply. The remote controller could be provided as an alternative to or in addition to the shown keypad 15 and display 16.

If a wall socket arrangement is used to house the control system, it could be made the size of a normal double socket with one socket being replaced by the usage control system components. Setting could be achieved, as suggested above, using a remote control with both the remote and the wall socket being provided with display units.

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CLAIMS

What we claim is:

- 5 1. A supply current usage control system in or for use in a power supply path for an apparatus, which system comprises:

 timer control means which may be set to specify a total time duration for which supply of operating current to said apparatus is to be permitted to flow through the supply path;

- 10 switch means controllable by the control means for permitting or interrupting the flow of operating current through the supply path; and

 current flow detection means for detecting the flow of apparatus operating current and for providing an output to said timer control means indicative of operation of said apparatus to enable determination of the cumulative time of operation of the
15 apparatus.

2. A supply current usage control system according to claim 1, wherein the current flow detection means is or may be set with an offset current threshold, whereby standby currents below the threshold are ignored for the purpose of determining the
20 duration of the flow of apparatus operating current indicative of actual operation of the apparatus.

3. A supply current usage control system according to claim 1 or 2 wherein the timer control means can be set both to determine a cumulative apparatus operational use
25 period and to specify a specific daily time period or time periods during which this cumulative use period may be built up.

4. A supply current usage control system according to any preceding claim, wherein the system is provided in the form of an adapter that can be plugged into an
30 electric supply socket and which can have an apparatus supply cable wired to it or plugged into it and is provided with security arrangements to prevent unauthorised unplugging or unwiring of the apparatus supply cable.

5. A supply current usage control system according to any of claims 1 to 3, wherein the system is built into a wall socket.

5 6. A supply current usage control system according to any of claims 1 to 3, wherein the system is built into the apparatus to be controlled.

10 7. A supply current usage control system according to any of claims 1 to 3, wherein the system is part of a house central computer controlled house unit where the timing control means is constituted by a central computer unit and the current flow means is incorporated in or in association with a wall socket in the house.

15 8. A supply current usage control system according to any preceding claim, wherein means are provided to prevent or restrict alteration of the set time other than by the authorised person.

20 9. A supply current usage control system according to claim 8, wherein a tamper switch arrangement is provided, which arrangement is designed to produce a signal for said control means to set the usable period to zero in the event of unauthorised tampering or apparent tampering with the system.

25 10. A supply current usage control system according to claim 9, wherein the tamper switch is in the form of a micro-switch with an operating pin or button in contact with the inside of a lockable casing or other security arrangement for the system, for part of the system or for the timer unit of the system and which micro-switch causes a signal to be sent to the control unit if the casing is opened or attempted to be opened by an unauthorised person.

30 11. A supply current usage control system according to claim 8, wherein the system employs key operated means or password systems to ensure time settings may only be changed by those in possession of the key or password.

12. A supply current usage control system according to any preceding claim, wherein audible and/or visual warning means are provided to give an audible and/or

visual signal a specified period before operating supply current is to be switched off by the control means.

5 13. A supply current usage control system according to any preceding claim, wherein the timer control means or setting means for the timer control means is in a remote control unit separate from the wall socket unit or adapter unit having the current flow detection means and switch means, with signal transmission and reception means being provided between the units.

10 14. A supply current usage control system substantially as hereinbefore described with reference to the accompanying drawing.

ABSTRACT

5 The invention discloses a power supply current usage control system in or for use in a power supply path (E, N, L) for an apparatus. The system comprises: timer control means (13, 14, 15, 16) which may be set to specify a total time duration for which supply of operating current to said apparatus is to be permitted to flow through the supply path; switch means (19, 20) controllable by the timer control means for permitting or interrupting the flow of operating current through the supply path (E, N,
10 L); and current flow detection means (8) for detecting the flow of apparatus operating current and for providing an output to said timer control means indicative of operation of said apparatus to enable determination of the cumulative time of operation of the apparatus.

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